

'5-CHIP NIBL-MM'

1. NIBL-MM is a memory-mapped version of the standard NIBL interpreter. Standard NIBL is intended for low speed work with such peripherals as teletypes communicating serially at 110-baud.
2. A very worthwhile improvement in speed results from the memory-mapping technique, as well as providing the facility for plotting low resolution graphs (see example 1 on sheet five). This alternative version is called NIBL-MM and is supplied in 4 x 2708 EEPROMS as follows:

NIBL-MM (1)	0000-03FF	(hexadecimal addresses
NIBL-MM (2)	0400-07FF	are used throughout
NIBL-MM (3)	0800-0BFF	most of this leaflet)
NIBL-MM (4)	0C00-0FFF	
3. Two programs which are commonly used in addition to NIBL-MM are 'K34' (the memory-mapped version of the old serial KITBUG program), and 'U34' (containing the 'utility' machine code programs, such as hex add/subtract, screen clear, etc.). Each is supplied in a single 2708 for operation at the following addresses:

K34	3000-33FF
U34	3400-37FF
4. For the RAM requirements for NIBL-MM, K34, U34, see our leaflet 'SC/MP FIRMWARE SW4/2'; if you do not have this or a later issue, please contact us.
5. The NIBL-MM interpreter is the same length as the earlier NIBL serial version (except for a few bytes), and in order to fit it in some shortcomings had to be tolerated: In particular the error message does not include the detailed error code, also backspace (betraying the interpreter's serial origins) echoes as 'H H', and does not delete the previous character, although the backspace function is interpreted correctly inside NIBL-MM.
6. It is only necessary to suffer the shortcomings mentioned in paragraph 5 if the NIBL-MM interpreter is restrained to 4K in length. If the U34 utilities firmware can be included in the system, then it has proved possible to use some spare space in the utilities PROM to improve the NIBL-MM interpreter.
7. The following improvements result:
  - 'Control U' deletes the line on the screen.
  - 'Backspace' (Control H) moves the screen cursor back, deleting the previous character.
  - 'Control O' clears the screen (direct mode only).The full set of error codes are now displayed.

8. The new NIBL-MM program is called '5-CHIP NIBL-MM', although it still consists of four x 2708's, the fifth chip being a modified 'U3'. The following diagram tries to make the arrangement easier to understand:

<u>Address</u>	<u>NIBL-MM</u>	<u>5-CHIP NIBL-MM</u>
0000	NIBL-MM(1)	NIBL-MM(1)
0400	NIBL-MM(2)	NIBL-MM(2)
0800	NIBL-MM(3)	NIBL-MM(3)
0C00	NIBL-MM(4)	NIBL-MM(4B)
(3000)	(K34, if used)	(K34, if used)
3400	(U34, if used)	U34 (always used)

Both NIBL-MM(4) and U3 have to be modified to form NIBL-MM(4B) and U34, and once this is done the interpreter will not work unless U34 is also present, hence the name '5-CHIP NIBL-MM'.

The price for the first four chips is the same whichever version is purchased.

9. As U34 contains all of the routines which were contained in U3, in addition to the extra ones needed by the modified NIBL-MM, we are now supplying this version whenever U3 has been ordered. If both NIBL-MM and U34 are ordered we will automatically supply the '5-CHIP NIBL-MM' versions.
10. We want everybody to have the best version of NIBL-MM wherever possible, and therefore for those customers who have already purchased the old NIBL-MM and U3, we will reprogram to the new version free of charge except for £1.00 handling (+15% VAT). (The first 3 chips are unaffected, so it is only necessary to return NIBL-MM(4) and U3 if this service is required.)
11. Implementation of NIBL-MM (4 or 5 chip version) is straightforward. There are however some points which are worth stressing:

VDU address 4400-46FF (If using our boards, both DCR-6 and VDU-G have to be set.)

Keyboard address 4700 (DCR-6 card for links; arrange for a positive (L) strobe if you are using an 81LS96 buffer).

Firmware as paragraph 8 above (PRM-8 board links).

RAM 1000 upwards (at least 1K, preferably 2K or 4K, MXA-3 board links).

Tie the sense-B line on SC/MP II (or the input of its buffer if it is buffered) high via a resistor to +5V. A push-button switch to ground will act as a 'Break' key, which is used to recover control over NIBL-MM programs which are running in a loop, or to break into a 'LIST' command.

Sense-A is not used by NIBL-MM but it (or its buffer) are commonly tied low via a resistor to ground, with a push-button to +5V. (This is the 'Interrupt' for machine-code work, but it is disabled by NIBL-MM, which uses Pointer P3 extensively and so cannot spare it for interrupts.)

A reset button should be provided to reset SC/MP II and thus initialise the NIBL-MM interpreter. This will act as an escape if the Sense-B (Break) Key cannot be used to recover control (as will sometimes happen to everyone, even the most experienced of programmers!)

Operation can be with either 2MHz or 4MHz (SC/MP II). However 4 MHz is suggested if compatibility with other hardware and software is a factor to be considered, (e.g. EEPROM programmer, tape interface etc.).

12. Operating procedures (both versions): Most of the information needed is provided in the publication 'NIBL Reference Guide', but the following points may prove helpful. On sheet 7 of this leaflet the main NIBL-MM features are summarised.

On switch-on (or after pressing reset) NIBL-MM will look for a NIBL-MM program in ROM on page '2' (i.e. address 2000) onwards. If there is no ROM-based program there NIBL will return to Page 1 in editing mode displaying the prompt '>'.

A program will be 'lost' if initialise is pressed, but it can easily be recovered as follows: (In these examples it is assumed that the first line of your NIBL-MM program was line 10):

```

Page 1:   Type @ #1120=0 Carriage Return @ #1121=10
Page 2:   "   @ #2002=0      "           "   @ #2003=10
Page 'P': "   @ #P002=0      "           "   @ #P003=10,
           where 'P' is the NIBL-MM page number

```

Alternatively the machine code operating system command 'M' can be used if 'K34' is in the system:

```

e.g.      1120 00
           1121 0A (0A is the hexadecimal equivalent
                  of 10, the decimal line number)

```

K34 is reached by the command LINK #3000. (The K34 program displays the prompt '\_' to distinguish it from the '>' of NIBL-MM.)

To return to NIBL-MM press initialise. This will 'lose' any existing NIBL-MM programs in RAM, so if this is not desired the re-entry point 0076 must be used, alternatively 0970 will suffice.

The following sequence can be used to return from K34. Using the 'M' command in K34 set up the following:

```

3FF7 09
3FF8 70

```

Press any <sup>non-hex</sup> key to exit from the 'M' command mode, then 'G', carriage return.

If a machine code program is correctly written, return from a machine code subroutine is entirely automatic. e.g. if U3 or U34 is present the NIBL-MM command LINK 3500 will call the machine code utility routine which clears the screen and returns to NIBL-MM exactly where it left off, except for the desirable effect that any output will begin at the top of a blank screen.

For this reason the line

10 LINK #35C0  
is often a convenient first line in a NIBL-MM program.

(With '5 CHIP NIBL-MM' in direct mode the screen can be cleared by pressing Control O.)

Another useful routine in U3 or U34 is the delay routine. Named after the famous '555' timer i.c., it is to be found at #3555. It uses the NIBL-MM variable X, and is easiest to explain by example:

```
e.g. 10 LINK#35C0: REM (CLEARS SCREEN)
      20 X=5000
      30 PRINT " I'M GOING"
      40 LINK#3555: REM (DELAYS X MILLISECONDS)
      50 PRINT " I'M BACK!"
```

With a 2MHz crystal the delay at line 40 is approximately 5 seconds. For other delays line 20 should be altered to suit, e.g. for a 3.25 second delay line 20 would be

```
20 X=3250
(With the suggested 4MHz crystal frequency, all delays are halved.)
```

13. The list of utilities in U3 or U34, and where to find the operating instructions, is given in our leaflet AN-C3 U3, or AN-C3 U34 (This leaflet is only available to purchasers of the U3 or U34 firmware).

However the list is repeated here for convenience.

<u>Address.</u>	<u>Program Name.</u>	<u>Function.</u>
3400	CLOAD	Loads data from cassette.
343C	CDUMP	Dumps data to cassette.
3480	HEX ADD/SUB	Performs hexadecimal addition and subtraction (for calculating jumps).
3500	MOVE	Moves blocks of data in memory.
3580	MESSAGE SUBROUTINE	Permits ASCII Message strings to be displayed.
35C0	CLEAR SCREEN	Clears memory-mapped VDU screen.
3555	DELAY (NIBL-MM)	Provides a delay in NIBL-MM programs.

14. When loading or dumping programs using the cassette recorder, it is handy to know where NIBL-MM has them located, and their length:

<u>NIBL-MM Page No.</u>	<u>Starts</u>	<u>Length.</u>
Page 1	111E	(TOP-#111E)
Page 'P'	P000	(TOP-#P000)

NIBL-MM will obligingly calculate the length and display it (in decimal) by executing a PRINT statement in immediate mode:

```
e.g. (Page 1): PRINT (TOP-#111E) or for short
              PR TOP-#111E.
```

15. The next pages give some demonstration NIBL-MM programs, and the brief summary of the commands.

## KEMITRON ELECTRONICS.

### NIBL-MM

This software package is a memory mapped display version of the National Semiconductors NIBL. The new version has all the features of the standard version but has a very fast writing speed and direct control of the cursor from basic. Two of the NIBL variables are no longer available as they are used in the modification. The variables affected are Y and Z. Z is specifically used to store the cursor position and by altering the value of Z the cursor can be moved and low resolution graphics plots made. When the cursor is at the top left hand position Z has the value 17408 and increases by one for each character position along the line. Thus the value of Z for the start of the second line is 17440 as there are 32 characters to each line. The variable Y has been used as a storage area for one of the pointer registers. Setting Z equal to zero has the effect of moving the cursor to the top of the screen.

The following example shows how a simple graph may be plotted:-

5 Z=0	}	If U3 or U34 is installed, these lines may be replaced by 10 LINK# 35C0
10 FOR A=1 TO 24		
15 PRINT " "		
20 NEXT A		
25 Z=0		
30 FOR B=-8 TO 11		
35 PRINT " ";:Z=Z+B*B/4-B+4		
40 PRINT "x"		
45 NEXT B		
50 PRINT " 0";		
55 FOR C=1 TO 30		
60 PRINT"+";		
65 NEXT C		
70 PRINT "QUADRATIC CURVE Y=X*X-4B+16"		

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# TABLES TEST.

```
10 Z=0
15 FOR D=1 TO 24
20 PR " "
25 NEXT D
30 A= RND(1,12)
35 PR "7*", A, " ";
40 INPUT B
45 IF B= 7*A GOTO 60
50 PR "WRONG - TRY AGAIN"
55 GOTO 35
60 PR "CORRECT - HAVE A SMARTIE"
65 GOTO 10
```

Or, 10 LINK#35C0

## PRIMES - By the 'Sieve of Erasthones' (276-195B.C.)

```
10 T=TOP
15 FOR A=1 TO 100
20 @(T+A)=1
25 NEXT A
30 PR "PRIMES FROM 2 - 100"
35 FOR I=2 TO 100
40 IF @(T+I)=0 GOTO 70
45 PR I
50 IF I>9 GOTO 70
55 FOR J=I TO 100 STEP I
60 @(T+J)=0
65 NEXT J
70 NEXT I
```

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## USE OF \$ STRINGS

```
10 LINK #35C0
20 PR " WRITE YOUR NAME"
30 T=TOP
40 INPUT$T
50 PR " HELLO ";
60 PR$T
```

## NIBL NOTES.

NIBL is a version of the BASIC computer language adapted for use with SC/MP.

### 1. Program entry.

- A. A line without a number executes immediately.
- B. Lines with numbers are inserted in order in the program.
- C. No blanks are allowed in the Keywords.
- D. CONTROL/H deletes the last character.
- E. CONTROL/U deletes the entire line.

### 2. Commands.

- A. NEW deletes the program.
- B. LIST lists the program.
- C. RUN starts the program.

### 3. Expressions.

- A. Variables A through Z (N.B. X and Z dedicated to VDU).
- B. Integer values 32767 to -32767.
- C. Hexadecimal values denoted by #.
- D. Operators +, -, \*, /, =, AND, OR, NOT, (GT), (LT).

### 4. Functions.

- A. RND(a,b) Random number from a to b inclusive.
- B. MOD(a,b) Remainder from a/b.
- C. STAT Status register.
- D. TOP End of program in memory.

### 5. Input/output.

- A. INPUT X,Y
- B. PRINT A
- C. PRINT "ANSWER", A
- D. Semicolon suppresses Carriage return that follows normal PRINT.

### 6. Statements.

- A. LET A=3
- B. GOTO 10
- C. DO/UNTIL
- D. FOR/NEXT
- E. GOSUB 35, RETURN

### 7. Indirect Operator.

- A. B=@1120
- B. @1800 = 44

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